NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

**Trusted Computing Exemplar:
Low-level Design Document Standards**
by

Paul C. Clark, Cynthia E. Irvine, and Thuy D. Nguyen

12 December 2014

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NAVAL POSTGRADUATE SCHOOL
Monterey, California 93943-5000

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This report was prepared by:

_____   _____

Paul C. Clark   Cynthia E. Irvine
Research Associate   Distinguished Professor

_____

Thuy D. Nguyen
Research Associate

Reviewed by: **Released by:**

_____   _____

Cynthia E. Irvine, Chair   Jeffrey D. Paduan
Cyber Academic Group   Dean of Research

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14. ABSTRACT

This document describes the Life Cycle Management Plan for the development of a high assurance secure product. A high assurance product is one for which its users have a high level of confidence that its security policies will be enforced continuously and correctly. Such products are constructed so that they can be analyzed for these characteristics. Lifecycle activities ensure that the product reflects the intent to ensure that the product is trustworthy and that vigorous efforts have been made to ensure the absence of unspecified functionality, whether accidental or intentional.

This document provides the standard format for writing low-level design documents.

Low-level design documents provide a detailed description of one or more modules. The level of detail should be sufficient such that two independent implementations will produce functionally equivalent modules.

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Paul C. Clark
Cynthia E. Irvine
Thuy D. Nguyen

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ATTRIBUTION REQUEST

December 2014

The Cyber Academic Group (CAG) and the Center for Information Systems Security Studies and Research (CISR) at the Naval Postgraduate School (NPS) wish to facilitate and encourage the development of highly robust security systems.

To further this goal, the NPS CAG and NPS CISR ask that any derivative products, code, writings, and/or other derivative materials, include an attribution for NPS CAG and NPS CISR. This is to ensure that the public has a full opportunity to direct questions about the nature and functioning of the source materials to the original creators.

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1 Introduction

This document has been written in support of a research project to publicly demonstrate and document how a high assurance product can be developed and distributed. A high assurance product is one for which its users have a high level of confidence that its security policies will be enforced continuously and correctly. Such products are constructed so that they can be analyzed for these characteristics. Lifecycle activities ensure that the product reflects the intent to ensure that the product is trustworthy and that vigorous efforts have been made to ensure the absence of unspecified functionality, whether accidental or intentional.

This document provides the standard format for writing low-level design documents.

Low-level design documents provide a detailed description of one or more modules. The level of detail should be sufficient such that two independent implementations will produce functionally equivalent modules.

2 Document Structure

Low-level design documents shall be structured according to the following format. Data types shall be provided for all databases, database elements, constants, variables, inputs, outputs, functions, and error messages.

2.1 Introduction

2.1.1 Module Description

This section shall provide a brief description of the module(s) under design.

2.1.2 Abbreviations

This section shall provide a list of all abbreviations and acronyms used in the design.

2.2 Low-level Design Constraints

This section shall provide a list of requirements, with descriptions, related to the module(s) under design. This section may be further divided into subsections if necessary, desirable, or appropriate. Requirements the module(s) must meet which are listed in other documents shall not be repeated here.

2.3 Constants

This section shall list all constants, with data types, used in the design. This section may be further divided into subsections if necessary, desirable, or appropriate. Module-specific constants shall not be listed here, but shall be listed in the appropriate module subsection.

2.4   Database

This section shall contain a subsection for each database used in the design. Each subsection shall describe the database, list the organization of the database (the fields it contains, including data types), list any constraints on the database (e.g. it is not modifiable during run-time), and specify the module that manages the database.

2.5   Layering

This section shall contain a subsection for each layer used in the design. Each subsection shall list the modules contained within the layer.

2.6   Modules

This section shall contain a subsection for each module used in the design. Each subsection shall describe the module in terms of the interfaces it provides, including function name and a brief description of the purpose of the function. Each subsection shall also describe any module specific constants. Each module shall be identified as either a module that enforces a security policy, or a module that supports the enforcement of a security policy, or a module that is non-security-relevant. For each module, the lower-layer modules upon which it depends shall be listed in each subsection. The detailed design of the module is not included in this section.

2.7   Detailed Design

This section shall contain a subsection for each module used in the design. Each subsection shall describe the detailed implementation of the module. The format of each subsection shall be as follows:

2.7.1   Module name

Include a brief description of the module.

2.7.1.1 Internal Constants

Include a list of internal constants, with data types, used by the module.

2.7.1.2 Module data

Include a list of internal data, with data types, used by the module. This includes the database that the module manages.

2.7.1.3 Module functions

This section is repeated for each module function. Module interface functions shall be listed first, followed by module internal functions, if necessary. Each function section shall consist of a brief description of the function, a C language prototype of the function (including data types for inputs, outputs, and the function return value, if any), and the following subsections:

2.7.1.3.1 Inputs

This section shall contain a list of each input to the function. The list shall contain a description of the input, and any restrictions on the input, if applicable.

2.7.1.3.2 Processing

This section shall describe the processing of the function. The processing shall be listed in sequential order. Indentation shall be used to differentiate conditional processing, or repeated (looping) processing. The descriptions shall use natural language with reference to module data and constants as appropriate. The use of other modules (function calls into other modules) shall include the name of the function called, the parameters passed to the function, the outputs from the function, and the name of the module being called.

2.7.1.3.3 Outputs

This section shall contain a list of each output from the function, including a function return value, if applicable. The list shall contain a description of each output. If a function return value is included, then the possible values, including exceptions, shall be listed and described.

2.7.1.3.4 Effects

This section shall describe the effects of invoking the function.
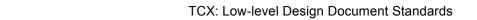
2.7.1.3.5 Error messages

This section shall describe any error messages generated by the function.

References

The following were referenced directly in this document.

[1]   *Common Criteria for Information Technology Security Evaluation*, version 2.2, 2004.

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4. Paul C. Clark   1
   Naval Postgraduate School
   Monterey, California 93943

5. Dr. Cynthia E. Irvine   1
   Naval Postgraduate School
   Monterey, California 93943

6. Thuy D. Nguyen   1
   Naval Postgraduate School
   Monterey, California 93943